



Illinois Department of Transportation

Memorandum

To: ALL BRIDGE DESIGNERS 02.1
From: Ralph E. Anderson *Ralph E. Anderson*
Subject: Bridge Painting Policy
Date: March 12, 2002

This memorandum is to inform you of changes in our cleaning and painting policy and the special provisions related to this work. This memo supersedes the previously issued Bridge Memorandum 97.6. These changes are a result of a joint FHWA /IDOT process review of bridge painting conducted in 1999. As a result we are issuing new special provisions for "Cleaning and Painting Existing Metal Structures" and "Containment and Disposal of Lead Paint Cleaning Residues", along with a revised policy for their use.

Major Cleaning and Painting Specification Changes:

- Two new paint systems have been developed for painting existing structural steel. The first system is for painting after full removal of the existing system and is comprised of an organic zinc primer, an epoxy intermediate coat and a full finish coat of polyurethane (OZ/E/U). The second system is for overcoating existing paint systems and consists of a full coat of epoxy sealer, a spot coat of aluminum epoxy mastic and a full finish coat of polyurethane (PS/EM/U). The urethane is less weather sensitive than the acrylic coat and thus, may extend the painting season. The organic zinc primer offers superior corrosion resistance vs. an epoxy mastic when applied to blast cleaned surfaces.
- The special provisions have been revised to place emphasis on the Contractor performing quality control functions and IDOT performing quality assurance functions.
- Surface preparation Methods 1, 2 and 3 have been renamed to correspond with the industry standards:
 - Near White Metal Blast Cleaning per SSPC-SP10 (previously Method 1, Commercial Grade Blasting SSPC-SP6) will be specified for all abrasive blast cleaning. This method can be achieved by wet or dry blasting methods.
 - Power Tool Cleaning per Modified SSPC-SP3 (previously Method 2) will be used for spot power tool cleaning.
 - Power Tool Cleaning - Commercial Grade (previously Method 3) will be used for power tool cleaning when the surface will be completely cleaned by power tools.

- Soluble salt remediation will be required, regardless of the surface preparation method, to ensure that soluble salts are removed before applying the paint system. The method of removal will be the Contractor's option and the surfaces must be re-tested to ensure the removal effort was adequate prior to painting.
- Bridge washing, prior to surface preparation, is no longer required for full removal cleaning, but will only be required when overcoating the existing paint system. All water used for washing lead coatings must be collected and properly disposed of as a waste.

Major Containment Specification Changes:

- The two special provisions and pay items for containment and disposal of blasting and power tool cleaning residues have been combined into one.
- Similar to the paint special provision, quality control is emphasized as the Contractor's responsibility and quality assurance as IDOT's responsibility.
- The containment types are now specified to follow the Society for Protective Coatings (SSPC) containment criteria.
- Environmental air monitoring will be required only if sensitive receptors are within 1000 ft of the structure. Sensitive receptors are defined as homes, schools, parks, playgrounds, shopping areas, livestock areas and businesses. A note will need to be placed on the plans when monitoring is required.
- Soil and water samples are no longer required. Clean up of the work area will be required to remove all debris even if it was a pre-existing condition.
- Emissions will be monitored by visual means per SSPC Guide 6, Guide for Containing Debris Generated During Paint Removal Operations.
- Water used for bridge washing when the existing coatings contain lead will have to be collected and disposed of as a waste.
- For major structures such as trusses, any containment attached to the structure will require calculations prepared, signed and sealed by a Structural Engineer licensed in the State of Illinois. These calculations shall demonstrate that the proposed containment structure will not transmit any detrimental loads to the structure.

New check lists for both specifications along with various other forms have been developed to assist the Inspectors and the Contractors with this work. Copies of these forms will be made available through the District Paint technicians.

Painting Policy:

- There are now two paint systems available for coating bare existing structural steel: a new organic zinc, epoxy and polyurethane (OZ/E/U) system, and the old epoxy mastic and acrylic (EM/EM/AC) system. The OZ/E/U system should offer superior corrosion protection and be less weather sensitive than the Acrylic system, thus extending the painting season. It is recommended that the OZ/E/U system be specified whenever possible. The EM/EM/AC system should be used when new and existing steel are mixed together to preserve continuity of the finish coat between both steels.
- There are also two paint systems for overcoating painted existing structural steel: a new penetrating sealer, epoxy mastic and polyurethane (PS/EM/U) system, and the old penetrating sealer epoxy mastic and acrylic (PS/EM/AC) system. Both are designed to go over power tool cleaned surfaces.
- Emphasis for bridge painting is to protect the existing steel from section loss. The typical areas of the structure to be cleaned and painted are:
 1. Structural steel beneath deck joints. This area should be fully blast cleaned and painted to protect these areas of high corrosion. Typically this area would include all steel within 5 feet of the deck joint measured along the girder, this length can be increase for deep girders or for skews larger than 40°.
 2. The fascia beams (outside and bottom of bottom flange surfaces of exterior beams). The existing paint on these beams should be completely removed by blast cleaning or power tool cleaning to minimize the possibility of delamination of the coating system.
 3. Underside of structures (all interior beams and inside surface of exterior or fascia beams). These beams are typically spot power tool cleaned and overcoated. Combinations of Commercial Grade and Modified SSPC-SP3 power tool cleaning may be appropriate depending on the existing overcoating condition. The underside should only be cleaned and overcoated when the existing paint system is in relatively good condition. If the paint is not in good condition, it should be completely removed or not painted at all. Overcoating guidelines to help with this decision process are included with this memo.
- Structures over water and railroads will typically be cleaned and painted only at the deck joints and the fascias. The underside should not be painted unless justification is submitted to the BB&S.
- For grade separation structures the areas under the deck joints should be blast cleaned and painted. The existing coatings on the fascias should be completely removed and painted. The underside may be overcoated if the existing coating system can be classified as “LR” (Low Risk) or better (per attached guidelines). If it can be classified as “NO” (high risk), then the

existing coating should be completely removed or not painted at all.

- On rehab projects where the structural steel is being evaluated for replacement, the painting costs should be included in the analysis between complete superstructure removal vs. reusing some or all of the existing structural steel.
- Painting of existing steel will typically continue to be done under contracts separate from the rehabilitation work. Special projects may include painting of bridges along with the rehabilitation when traffic or other logistic restraints dictate. Documentation of such should be submitted prior to TSL approval. Even though the cleaning and painting of the steel may be delayed to a separate contract, the scope of the cleaning and painting work proposed needs to be fully documented prior to TSL approval.

The criteria for painting under a separate paint contract are as follows:

- Existing structural steel requires repainting, and
- There is little or no new steel being added, or
- There is a major amount of new structural steel* added to the existing but the steel is not subjected to salt spray (i.e., bridges over railroads and streams).

*Major amount of new structural steel is defined as at least one entire new beam line. Minor steel is anything less than a beam line (i.e., diaphragms and/or bearings).

- Truss, arch, bascule, or other complex structures should be evaluated on a case by case basis to determine the best painting strategy. Typically, as a minimum, the splash zone (bottom cord to 12 ft above the deck) should be blast cleaned, the remainder power tool cleaned and overcoated. In addition, trusses are normally painted in combination with the rehabilitation contract. The Bureau of Bridges and Structures should be consulted for concurrence on the scope of work.
- Starting with the November 2002 letting, all painting contractors will be required to be certified per the Society for Protective Coatings SSPC-QP1 and SSPC-QP2 standards. For projects where the total surface area being cleaned and painted is less than 50,000 sq ft exemption of the certification requirements will be allowed.
- Cleaning and painting of new steel will also require SSPC-QP1 certification according to the special provision for Cleaning and Painting New Metal Structures.
- For structures that require cleaning and painting, but do not have existing lead coatings on them, containment of the cleaning residue will not be necessary if there are no sensitive receptors within 1000 ft or 5 times the bridge height. Containment may be specified if, for example, control of nuisance dust or spent abrasive is a priority. If that is the case, a note on the plans will be required which should clarify why the containment is required. For those areas where containment is specified or where

sensitive receptors are within 1000 ft or 5 times the bridge height, a pay item for containment of cleaning residues will be required. No air monitoring units will be required.

- For experimental projects please coordinate with the Bureau of Bridges and Structures for approval prior to initiating contract preparation.

Attached are the overcoating guidelines, economic analysis and typical painting notes.

Overcoating Guide

The largest factors that affect the ability of an existing coating to be overcoated are the amount of corrosion, the thickness of the existing coating and the adhesion of the existing coating.

The amount of corrosion shall be estimated based on field observations. Typically it can be determined from the most recent Pontis inspection. The amount of corrosion will be listed in the Pontis report. The percent corrosion when totaling condition states 2 through 4 should be below 15%. If higher, it probably will not be economical to spot power tool clean and overcoat. In that case two options remain; do not paint the surfaces at all, or perform full removal by abrasive blasting or power tools and repaint.

The thickness of the coating should be measured with a calibrated film thickness gauge. The adhesion should be measured using ASTM D 3359, Method A (X Cut).

The following table should be used to assess the existing coating for over coating risk.

Adhesion Rating	Thickness (mils)			% Rust
ASTM D 3359, Method A	< 10	10-20	>20	> 15
5A	NR	NR	LR	NO
4A	NR	NR	LR	NO
3A	NR	LR	MR	NO
2A	LR	MR	NO	NO
1A	MR	NO	NO	NO
0A	NO	NO	NO	NO

NR = essentially no risk

LR = low risk

MR = moderate risk

NO = condition too poor to salvage

Economic Analysis for Existing Structural Steel

- Blast Clean per SSPC-SP10 and paint with System^a 1 or 3
Estimated cost range: \$7.00 - \$12.00 per sq. ft.*
- Power Tool Clean per Modified SSPC-SP3 and paint with System^a 2 or 4
Estimated cost range: \$3.00 - \$5.00 per sq. ft.*
- Power Tool Clean – Commercial Grade and paint with System^a 1 or 3
Estimated cost range: \$4.00 - \$6.00 per sq. ft.*

For zone cleaning and painting or for complex bridges use the high end of the range for Blast Clean per SSPC-SP10.

Large surface areas may justify the use of the lower unit costs.

^a Paint Systems:

System 1 = OZ/E/U

System 2 = PS/EM/U

System 3 = EM/AC/AC

System 4 = PS/EM/AC

- * The average cost is based on a range which varies depending on the type, size, location, degree of difficulty, etc. of the project.
The square foot cost for Power Tool Cleaning per Modified SSPC-SP3 and painting is applied to the total area painted not to just the area cleaned.

GENERAL NOTES FOR CLEANING AND PAINTING

February 22, 2002

- **Painting existing steel of highway grade separation structures including over coating underside (interior surfaces):**

Cleaning and painting of the existing structural steel shall be as specified in the special provision for "Cleaning and Painting Existing Steel Structures". All beams, bearings and other structural steel within 5 ft (measured along the beam) of either side of deck joints shall be cleaned per Near White Blast Cleaning – SSPC-SP10. The exterior surfaces and bottom of the bottom flange of the fascia beams shall be cleaned per Power Tool Cleaning – Commercial Grade. All remaining structural steel shall be cleaned per Power Tool Cleaning – Modified SSPC-SP3.

The designated areas cleaned per Near White Blast Cleaning – SSPC-SP10 and per Power Tool Cleaned - Commercial Grade shall be painted according to the requirements of Paint System 1 - OZ/E/U. The designated areas cleaned per Power Tool Cleaning – Modified SSPC-SP3 shall be painted according to the requirements of Paint System 2 - PS/EM/U. The color of the final finish coat for all interior steel surfaces shall be Gray, Munsell No 5B 7/1. The color of the final finish coat for the exterior and bottom flange of the fascia beams shall be (**).

- **Painting existing steel of railroad and stream crossings structures or grade separations when underside (interior surfaces) away from the joints are not to be painted:**

Cleaning and painting of the existing structural steel shall be as specified in the special provision for "Cleaning and Painting Existing Steel Structures". All beams, bearings and other structural steel within 5 ft (measured along the beam) of either side of deck joints shall be cleaned per Near White Blast Cleaning – SSPC-SP10. The exterior surfaces and bottom of the bottom flange of the fascia beams shall be cleaned per Power Tool Cleaning – Commercial Grade.

The designated areas cleaned per Near White Blast Cleaning – SSPC-SP10 and per Power Tool Cleaned - Commercial Grade shall be painted according to the requirements of Paint System 1 - OZ/E/U. The color of the final finish coat for all interior steel surfaces shall be Gray, Munsell No 5B 7/1. The color of the final finish coat for the exterior and bottom flange of the fascia beams shall be (**).

- **Painting of existing steel when entire structure will be blast cleaned:**

Cleaning and painting of the existing structural steel shall be as specified in the special provision for "Cleaning and Painting Existing Steel Structures". All existing steel shall be cleaned per Near White Blast Cleaning – SSPC-SP10. All existing steel shall be painted according to the requirements of Paint System 1 - OZ/E/U. The color of the final finish coat for all interior steel surfaces shall be Gray, Munsell No 5B 7/1. The color of the final finish coat for the exterior and bottom flange of the fascia beams shall be (**).

Note to designers regarding paint systems: Paint System 3 – EM/EM/AC may be substituted for Paint System 1 and Paint System 4 – PS/EM/AC may be substituted for Paint System 2. Do not mix the Acrylic and Urethane systems on the same structure. When inorganic zinc primed steel exists in substantial quantity use Paint System 3 and 4 respectively for the entire structure.

**** Colors for fascias:**

Interstate Green, Munsell No 7.5G 4/8
Reddish Brown, Munsell No 2.5YR 3/4
Blue, Munsell No 10B 3/6
Gray, Munsell No 5B 7/1

- **Until November 2002 and/or for small projects under 50,000 sq ft of total paint area on the project, add this additional note:**

The SSPC-QP1 and SSPC-QP2 Painting Contractor Certifications will not be required for this bridge.

- **On large complex projects where the containment will be supported by the bridge, add this additional note:**

The Contractor shall submit calculations and details demonstrating the structural integrity of the bridge is maintained under the additional imposed loads of the containment system, see special provisions.

- **On bridges where sensitive receptors are within 1000 ft or 5 X bridge height add this note:**

A minimum of (***) air monitor(s) will be required to monitor abrasive blasting operations at this site, see special provision for "Containment and Disposal of Lead Paint Cleaning Residues".

*** (between 1 and 4 monitors may be required between the bridge and the sensitive receptors based on the proximity and uniqueness of the sensitive receptors around the bridge. Sensitive receptors are defined as schools, homes, businesses, livestock, etc.) For example, if there was at one end of the bridge two homes, one 500 ft away, one 900 ft away, and one school 700 ft away from the bridge, two monitors would be required, one at the 500 ft home and one at the school.

- **On non lead, blast removal projects, where sensitive receptors are within 1000 ft or 5 X bridge height add this note:**

Containment of cleaning residue is required to control nuisance dust see special provisions.

- **Painting new steel as part of F&E structural steel:**

The Inorganic zinc rich primer / Acrylic / Acrylic Paint System shall be used for shop and field painting of new structural steel except where otherwise noted. The color of the final finish coat for all interior steel surfaces shall be gray, Munsell No 5B 7/1. The color of the final finish coat for the exterior and bottom flange of the fascia beams shall be (**). See special provision for "Cleaning and Painting New Metal Structures."

- **When painting new steel, until November 2002 add this additional note:**
The SSPC-QP1 Painting Contractor Certification will not be required for this bridge.
- **Repair painting/adjacent areas to new steel (only used if no other cleaning and painting is specified):**
Existing structural steel shall only be cleaned and painted as required by the special provision "Cleaning and Painting Adjacent Areas of Existing Steel Structures".
- **Painting new steel; on concrete structures, or where some new steel is being added to a primarily existing steel bridge:**
All new structural steel shall be shop painted with an inorganic zinc rich primer per AASHTO M 300, Type1.
- **Painting steel to be delayed to a separate paint contract:**
Field painting of structural steel shall be done under a separate painting contract.